THE JOURNAL OF
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

(Including Transactions)

Volume 36 APRIL 1914 Number 4

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C 55. The Society as a body is not responsible for the statements of facts or opinions advanced in papers or discussions.

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COMING MEETINGS OF THE SOCIETY

April 8, *Boston, Mass.*, Engineers Club. Subject: Small Package Conveyors with Reference to Industrial Plants. Papers: Selective Types of Conveyors, W. O. Hildreth, Lamson Company; Pneumatic Despatch Tubes, F. B. Williams, Lamson Company; Machinery for Handling Small Packages, S. L. Haines, Link-Belt Company.

April 10, *Buffalo, N. Y.* Address: Impressions of Industrial Germany, L. P. Breckenridge.

April 14, *New York City*, Engineering Societies Building. Paper: Graphic Statistics for the Engineer and the Executive, Willard C. Brinton.

April 29, *Providence, R. I.*, Masonic Hall. Joint Dinner of the Providence Association of Mechanical Engineers and the Society. Biograph lecture on The Manufacture of Wrought Pipe, from the Ore to the Finished Product, by Harold T. Miller, National Tube Company, Pittsburgh, Pa. Tickets, $2 each.

May 1, *New Haven, Conn.*, Mason Laboratory, Sheffield Scientific School. Quarterly meeting with sessions at 3 p.m. and 8 p.m. Subject: Internal-Combustion Motors as Applied to Aeroplanes and Automobiles.

May 5, *San Francisco, Cal.* Subject: Stationary Diesel Engine Operation using California Fuel Oil.

Spring Meeting, June 16–19, *St. Paul-Minneapolis.* See pp. III and XIII.

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THE SPRING MEETING

The Society is fortunate in its choice of location for the Spring Meeting to be held in St. Paul-Minneapolis on June 16 to 19. St. Paul, with its picturesque location and historic interest, is a most attractive city, and Minneapolis, although the great manufacturing center of the Northwest, is also one of the beautiful cities of the country. The picturesqueness of these cities and the attractions which they will inevitably have for the members who will attend this meeting are suggested in the collection of views shown elsewhere in this number.

The local committee in St. Paul and Minneapolis are making special efforts to arrange an attractive program of entertainment with opportunities for the inspection of the many interesting engineering features of that part of the country.

As at present arranged, the program is as follows: On the two opening days the meetings will be held in St. Paul, beginning with a reception on the evening of June 16. Mr. James Hartness, President of the Society, will make introductory remarks, which will be followed by a message to the engineering fraternity by Mr. James J. Hill, former president of the Great Northern System. Dancing will conclude the evening.

Wednesday morning, June 17, will open with a business meeting, to be followed by a professional session. The ladies will be shown about the city and will be entertained at luncheon. The afternoon will be devoted to a second professional session.

The Thursday morning session will be held in Minneapolis in the buildings of the University of Minnesota. A representative of the University will make the opening address, and luncheon will be served. During the morning the ladies will be shown about the city in automobiles. In the afternoon the members of the Society and their guests will be entertained by Mr. Gebhard Bohn at his beautiful home on Lake Minnetonka. Supper will be served and dancing will follow.

Friday will be devoted to technical excursions. There is a prospect of a trip to Duluth, in which case it is recommended that the party leave at 2.30 p.m., arriving in Duluth at 7.00 p.m., where a reception will be tendered by the local members of the Society. An opportunity will be given next day to inspect the Duluth harbor with all its engineering features. It is hoped that boat connections will be such that members from the East may return by way of the Lakes.

A further suggestion is a trip to Keokuk to inspect the great water power plant on the Mississippi River.

ENGINEERING DATA IN CONVENIENT FORM

Nobody unconnected in some way with its production, presentation, or preservation, realizes the extent of the increase in the rate of output of technical literature. The increasing number of researches undertaken by institutions of learning, professional committees, endowed laboratories and individual observers, the increasing number of papers presented to the always growing number of societies, the inducements offered by the publishers of books and periodicals, the data furnished by builders and purveyors of various apparatus, have resulted in a flood of technical literature which few have the capacity to pass and filter. It is a serious task upon one's time to read everything which appears, even relating to his own profession, and the specialist must confine his study and his accumulation of material to his own subject, or be swamped.

In the early days of the Society mechanical engineering was in itself quite a specific specialization, and the result of a year's activities could be adequately presented in a volume of reasonable size and cost. These volumes form an imposing array upon the bookshelves of many of the members, but occupy an exorbitant amount of space in proportion to the number of usable references which they contain.

With the advent of The Journal the Transactions became a duplication in presentation. Papers presented to the Society were published in The Journal previous to the meeting, and in the Transactions at the end of the year. The extra presentation in Transactions will cost $11,000 this year, and would

probably cost $15,000 next time if continued, on account of the fact that two volumes would be required. It appeared preferable to the Publication Committee:

a To print the papers separately, as usual, for distribution before the meeting.

b To make The Journal's treatment of the papers and the meetings a readable account of what they contain and accomplish.

c To bind the papers separately in paper covers, each with its discussions, rather than to bind them all together in the Transactions.

Members will be advised in The Journal of the papers which are to be presented at a coming meeting, and can obtain gratis copies of any or all of them by addressing the Secretary. They will thus have in The Journal (*a*) a copy of each paper in full or in abstract, and (*b*) an account of its presentation at the meeting, and of the discussion which it brought forth; and in addition they can have upon request (*c*) complete finished copies of the papers neatly bound with their discussions, and at a very low cost. It is believed that eventually these papers can be supplied to members requesting them free of expense.

A member who wants to keep the Transactions as he has been doing can simply request a copy of each paper presented during the year with its discussions, and get them bound in the style of former years. Those who want to specialize more can order the papers in which they are especially interested, and bind or file them as they see fit. Papers upon the same or similar subjects can be bound together into monographs or symposiums, and in addition the members can bind their Journals if they wish either in whole or in part, provision having been made in the paging for eliminating conveniently the several departments and the matter of merely present or passing interest.

COUNCIL NOTES

At the meeting of the Council on March 13 it was voted to approve the appointment of a Committee to consider and report to the Council standards for presenting graphically engineering data, tests, reports, etc., Willard C. Brinton, Chairman.

It was also voted to take such action as is necessary for the formation of a Standing Committee on Engineering Standards.

H. G. Stott, chairman of the Committee on Flanges, stated that he had attended the conference held in Washington on March 7, called by the Master Steam and Hot Water Fitters Association. Mr. Stott reported that the 1914 American Standard was adopted, with the exception of a few minor points, which it is hoped may be reconciled at a conference to be held very shortly between the committees of the Society, the Manufacturers' Association, and the Master Steam and Hot Water Fitters Association.

CALVIN W. RICE, *Secretary.*

LOCAL MEETINGS

A number of interesting meetings are scheduled for local centers during the Spring months, showing the widespread activity of the Society throughout the various sections of the country. All members of the Society are invited to attend all such meetings wherever held.

Regular monthly meetings are to be held in Boston, Buffalo and New York. That in Boston, on April 8, will discuss the subject of Small Package Conveyors with reference to Industrial Plants, with three papers to be presented: Selective Types of Conveyors, by W. O. Hildreth of the Lamson Company; Pneumatic Despatch Tubes, by F. B. Williams of the Lamson Company, and Machinery for Handling Small Packages, by S. L. Haines of the Link-Belt Company. In Buffalo on April 10, Prof. L. P. Breckenridge will make an address on Impressions of Industrial Germany. Willard C. Brinton will read a paper before the New York meeting on April 14 on Graphic Statistics for the Engineer and the Executive, in which he will cover some of the graphic methods not generally used by engineers, but which could be of very great assistance to men who must frequently boil down and abstract information and write reports. Such methods are in use by the biologist and statistician, and they could have wide application in the work of the engineer if more generally understood. Methods for keeping corporation operation records in convenient form for quick reference will be discussed.

The quarterly meeting of the New Haven members will be held in the Mason Laboratory of Mechanical Engineering, Sheffield Scientific School, on Friday, May 1, and will, as usual, have afternoon and evening sessions. Internal Combustion Engines as applied to Aeroplanes and Automobiles will be the subject, and the program is now being arranged. In San Francisco there will be a meeting on May 5 and, following the custom of considering topics of local importance, the subject will be Stationary Diesel Engine Operation using California Fuel Oil. These meetings are usually in the nature of a topical discussion, with one or two brief leading discussions to open the meeting.

The Providence Association of Mechanical Engineers, which is affiliated with the Society, will hold a joint dinner at Masonic Hall in Providence on April 29. A reception will be held at 6 o'clock, with dinner at 6.30. Prof. Wm. H. Kenerson will act as toastmaster, and there will be addresses by James Hartness and Calvin W. Rice, President and Secretary of the Society. A biograph lecture by Harold T. Miller of the National Tube Company of Pittsburgh, on Wrought Iron from the Ore to the finished Product, will follow these addresses. The March meeting was the last held in Philadelphia for the season and the April meeting the final one in New York.

TWO ENGINEERING CONGRESSES

INTERNATIONAL ENGINEERING CONGRESS

SAN FRANCISCO, 1915

To be held under the auspices of the five national engineering societies, the American Society of Civil Engineers, the American Institute of Mining Engineers, The American Society of Mechanical Engineers, the American Institute of Electrical Engineers and the Society of Naval Architects and Marine Engineers.

Every engineer is invited to participate in the International Engineering Congress, to be held in San Francisco, Cal., September 20-25, 1915, in connection with the Panama-Pacific International Exposition, and under the auspices of the five national engineering societies.

The Congress has two distinct purposes: (1) The gathering together of a large and representative body of engineers from all civilized countries, with the opportunities which this will present of forming or renewing personal acquaintances, and of interchanging views on the various phases of professional work; and (2) the reading and discussion of papers before the various sections and their later publication in such form as to constitute a valuable addition to any engineering library.

In scope and character, it is intended that the Congress shall be truly international and that it shall embrace in a thorough and comprehensive manner the various branches of the engineering profession. Eminent engineers throughout the world are being invited to contribute papers on assigned topics, and in the selection and distribution of these topics the committee is using its best endeavors to render the series of papers widely representative of the world's best engineering practice in its various branches.

There will be 11 general sessions, the proceedings of which will probably appear in 10 volumes of about 500 pages each, with one smaller or half volume, which will contain the general or business meetings, together with a title and author index and a brief digest of each paper presented.

The general fee for membership in the Congress is $5. This will entitle the member to receive the index volume and any single volume of the transactions which he may select, together with the right of participation in all the general activities of the Congress. All who are interested are invited to become members whether or not they may be able to attend the Congress, so that they may secure the very valuable proceedings for their libraries. Thus far 252 of our membership have enrolled.

In connection with the Congress, the Society looks forward with special anticipation to greeting again the many members of the engineering profession in Europe who made possible the two recent pleasurable trips abroad, in 1910 and 1913. H. L. Gantt has been appointed chairman of a reception committee.

INTERNATIONAL ELECTRICAL CONGRESS

SAN FRANCISCO, 1915

To be held under the auspices of the American Institute of Electrical Engineers, in conjunction with the Panama-Pacific International Exposition.

There have been ten electrical congresses of international scope, three of which have been held in America. The Conference of Electricians in 1884 was held in Philadelphia. The International Electrical Congress of 1893 was held in conjunction with the World's Columbian Exposition at Chicago. The Congress of 1904 met in St. Louis during the Louisiana Purchase Exposition. These congresses were notable among the many gatherings of international importance at these expositions.

The International Electrical Congress, San Francisco, 1915, is to be held in conjunction with the Panama-Pacific International Exposition, which will celebrate in a fitting manner the completion and opening of the Panama Canal. As this crowning achievement of science and engineering is certain to attract many engineers to the Canal and to the Exposition, it was early recognized that conditions would be propitious for convening electrical engineers of all countries in a congress in which the international feature would be unusually prominent.

One purpose of the forthcoming Congress is to bring together in San Francisco a large and representative body of electrical engineers from all over the world who shall find interest and inspiration in the Congress, in the Exposition, and in the celebration of the completion of the American inter-oceanic canal. A second purpose is to erect in its published transactions a notable milestone of electrical engineering progress and development as a permanent record of contemporaneous electrotechnical achievement.

The membership of the memorable St. Louis Congress in 1904 was over 2000 and the transactions included 150 papers with discussions. The immense growth of the electrical industry and the rapid progress of electrical science during the past decade justify expectations of a much larger membership and of greatly enlarged and even more authoritative and useful proceedings. The published transactions which are expected to constitute a very valuable addition to the literature of the art will be available to members at such a low price, that either in part or as complete sets they will be within reach of all. Those who may be able to attend the Congress may find a large measure of participation through possession of the transactions.

A TRIBUTE TO THE ENGINEERING PROFESSION

Many tributes to the engineering profession were recently paid in the honors shown to Col. George W. Goethals, U.S.N., builder of the Panama Canal, during his late visit to the United States. Notable among these was the presentation of the gold medal of the National Geographic Society at its annual banquet in Washington, on March 3, by President Wilson, who spoke of the nation-wide appreciation of the accomplishments of Colonel Goethals and of the important part of the engineer in the world's work. He said in part:

"The engineering profession is one of the few creative professions. Those of us who have attempted to be literary men conceive that we have created conceptions of the mind, but we never can produce them in court. They are never visibly on exhibition. But the magic of the engineer is that he can change the face of nature and show the work of his hands, and that it is in some deep sense creative in character. The life of mankind on the globe, for example, is altered by the cutting and the use of the Panama Canal.

We have, therefore, to honor the greatest living representative of this extraordinary profession. It seems to me to be natural . . . that the greatest engineer should come from the United States. The United States has made the world very uncomfortable, but it has at least done so by the exercise of extraordinary dynamic qualities. It is not one of the static nations of the world. It is one of the nations which has disturbed equilibrium, which has cut new paths for the thought and action of mankind. . . . We are merely acknowledging the presiding character and genius which drew all the elements of this work together, which made it a work done by colaborers—work done as if it were the conception of a single mind, and work done in the spirit of service and self-effacement, which belongs to a great service of a great government. There is nothing selfish in the eminence of Colonel Goethals. It is representative of a great profession; it is representative of a great government; it is representative of a great spirit."

A photograph of the medal is reproduced on another page of this issue.

At a meeting held in Carnegie Hall in New York City, the Civic Forum also presented a medal to Colonel Goethals, Dr. John H. Finley, head of the New York State Board of Education, making the speech of presentation. A poem in celebration of his accomplishments was written for the occasion by Percy MacKaye, and was read by its author. The following stanzas quoted from it show the tribute paid to the task of the engineer:

"A man went down to Panama
  Where many a man had died
To slit the sliding mountains
  And lift the eternal tide:
A man stood up in Panama,
  And the mountains stood aside.

. . . .

The reek of fevered ages rose
  From poisoned jungle and strand,
Where the crumbling wrecks of failure
  Lay sunk in the torrid sand—
Derelicts of old desperate hopes
  And venal contraband:

Till a mind glowed white through the yellow mist
  And purged the poison-mould,
And the wrecks rose up in labor,
  And the fevers' knell was tolled,
And the keen mind cut the world-divide,
  Untarnished by world gold:

For a poet wrought in Panama
  With a continent for his theme,
And he wrote with flood and fire
  To forge a planet's dream,
And the derricks rang his dithyrambs
  And his stanzas roared in steam.

. . . .

Where old Balboa bent his gaze
  He leads the liners through,
And the Horn that tossed Magellan
  Bellows a far halloo,
For where the navies never sailed
  Steamed Goethals and his crew.

GEORGE WESTINGHOUSE

No characterization of George Westinghouse could be more inclusive and complete than the single sentence uttered at a gathering in London by his intimate friend, the late Lord Kelvin, that "George Westinghouse is in character and achievements one of the great men of our time."

In another part of The Journal is a statement of the notable achievements of the professional career of Mr. Westinghouse which already are a matter of common knowledge as a vital part of the industrial history of the country. The other element mentioned by Lord Kelvin, that of the strength and fine qualities of his character, was equally admired by all his close friends, his workmen and subordinates, and his business associates.

Of the many remarkable qualities that come to one's mind in thinking of Mr. Westinghouse, none stand out more prominently than those which characterized him in his home life.

When separated from Mrs. Westinghouse, as he usually was for two or three days of each week, it was his uniform habit to hold a daily conversation over the telephone. It made no difference how far separated or how busy Mr. Westinghouse may have been, that greeting was exchanged not only at a definite hour, but with fondness and thought of every detail of Mrs. Westinghouse's comfort. Another beautiful feature of the conversation was the never-failing inquiry on the part of both for the guests of the other and the sending of messages of greeting for the guests.

Mr. Westinghouse had the most perfect balance

between strength and gentleness, both physical and mental, of anyone I ever knew. In fact, one might say he had the gentleness of strength under complete control.

Col. E. D. Meier, Past-President of the Society, has written that George Westinghouse "made 'Safety First' possible on railways long before that phrase was coined. His high ethical standards as an engineer, his splendid courage as a manufacturer, his limitless capacity for hard work, made him a hero in the never ending strife for the control of the forces of nature for the service of man."[1]

The funeral services held in the Fifth Avenue Presbyterian Church, New York City, were attended by a great throng of friends and admirers. Rev. S. J. Fisher, D.D., of Pittsburgh, who had known Mr. Westinghouse since as young men they had lived together in Pittsburgh, spoke of Mr. Westinghouse's life from his own personal knowledge. He paid a sincere tribute to his work and character, describing him as one who "walked in the full light of the world, every characteristic open, every phase of his life seen; nothing secret and nothing hidden." H. L. Gantt, Dr. Alex. T. Humphreys and S. T. Wellman, another life long friend since boyhood, represented the Society as honorary pall bearers, and other officers and members of the Society were in attendance.

At the last meeting of the Council a special committee, consisting of Jesse M. Smith and Dr. Alex. C. Humphreys, was appointed to draw up resolutions on the death of Mr. Westinghouse and these will be sent to the family. They read as follows:

"The Council and members of The American Society of Mechanical Engineers have learned with sincere sorrow of the passing away of George Westinghouse, Past-President and Honorary Member of the Society.

His genius as an inventor, designer and constructor has aided in making the Profession of Engineering in America known and respected the world around.

His air-brake invention was epoch-making in the field of transportation and changed the history of civilization.

His indomitable courage and perseverance have caused vast industrial works of national importance to exist.

His sterling uprightness in affairs has commanded the respect of all men.

His great-hearted manliness and purity of life have won the love of many friends."

CALVIN W. RICE, *Secretary.*

APPLICATIONS FOR MEMBERSHIP

Members are requested to scrutinize with the utmost care the following list of candidates who have filed applications for membership in the Society. These are sub-divided according to the grades for which their age would qualify them and not with regard to professional qualifications, i.e., the age of those under the first heading would place them under either Member, Associate or Associate-Member, those in the next class under Associate-Member or Junior, while those in the third class are under twenty-five years of age and therefore qualified for Junior grade only. The Membership Committee and in turn the Council urge the members to assume their share of the responsibility of receiving these candidates into the membership by advising the Secretary promptly of any one whose eligibility for membership is in any way questioned. Members will be furnished with complete records of any candidate thus questioned. All correspondence in regard to such matters is strictly confidential and is solely for the good of the Society, which it is the duty of every member to promote. These candidates will be balloted upon by the Council unless objection is received before May 11, 1914.

[1] Contributed to the Iron Trade Review.

FOR CONSIDERATION AS MEMBER, ASSOCIATE OR ASSOCIATE-MEMBER

ACKERMAN, J. WALTER, Ch. Engr. & Supt., Auburn Water Wks., Auburn, N. Y.

ADAMS, WILLIAM C., Engr., Chase Metal Wks., Waterbury, Conn.

ALBERTSON, DAN J., Civ. & Industrial Engr., and Mill Arch., Kalamazoo, Mich.

ALLEN, RAYMOND C., Civ. & Cons. Engr., and Engr. for town of Manchester, Mass.

ANDERSON, CHARLES H., Supt., Pumping Dept., Cincinnati Water Wks., Cincinnati, Ohio.

ANNETT, EDWARD B., Asst. Engr., Bd. of Pub. Utility Commissioners for State of New Jersey, Newark, N. J.

ATKINSON, ALBERT W., Asst. Secy., Victor Talking Mch. Co., Camden, N. J.

AUEL, CARL B., Dir. of Standards, Processes & Materials, Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

BACKER, ELMER F., Charge of new designs and experimental work, Davenport Locomotive Wks., Philadelphia, Pa.

BANCROFT, JOSEPH, Treas., Joseph Bancroft & Sons Co., Wilmington, Del.

BANKWITZ, FREDERICK E., Asst. Managing Engr., Fletcher-Thompson, Inc., Bridgeport, Conn.

BARNES, JOHN A., Inspr., Locomotive Superheater Co., New York.

BATES, GEORGE H., Secy. & Treas., Staten Island Shipbuilding Co., Staten Island, N. Y.

BAUMES, PALMER B., Dist. Mgr., Ball Eng. Co., St. Louis, Mo.

BAYARD, ROBERT A., Asst. to Supt., Norton Co., Chippewa, Ont.

BEAVER, CHARLES W., Mgr., Hoist Dept., The Yale & Towne Mfg. Co., New York.

BECKER, ADOLF J., Vice-Pres., Becker Steel Co. of America, New York.

BEDFORD, RUSSELL B., Pres., Railway Materials Export Corp., New York.

BEESON, ALPHONZO C., Vice-Pres. & Genl. Mgr., Indiana Pipe Line Co., Huntington, Ind.

BELCHER, WARREN J., Supt., Whitney Mfg. Co., Hartford, Conn.

BELL, JESSE M., Mech. Engr., Lockport, N. Y.

BELLAMY, LEON, Rep. & Designer, Dodge Mfg. Co., New York.

BERG, JOHN D., Vice-Pres., Dravo Doyle Co., Pittsburgh, Pa.

BERMAN, LOUIS K., Mgr., Raisler Heating Co., New York.

BERNHARD, JOHN H., Vice-Pres., Alabama & New Orleans Transportation Co., New Orleans, La.

BIEBLER, CONRAD A., Sales Engr., Hyatt Roller Bearing Co. and T. B. Woods Sons Co., Milwaukee, Wis.

BIRD, JAMES P., Treas., Watson-Stillman Co., New York.

BLACK, CHARLES A., Supt. of Dredging, Isthmian Canal Com., Cristobal, C. Z.

BLAKEMAN, JOHN W., Acting M. M., Bridgeport Brass Co., Bridgeport, Conn.

BONINE, CHARLES E., Cons. Engr., 609 Harrison Bldg., Philadelphia, Pa.

BOSLER, BENJAMIN E., Asst. Supt. of Mech. Dept., Shops, Cambria Steel Co., Johnstown, Pa.

BOSSINGER, ERNEST L., Asst. to Ch. Engr., The Midvale Steel Co., Philadelphia, Pa.

BRAMHALL, CHARLES T., Ch. Engr., The Exeter Machine Wks., New York.

BRAZIER, FREDERICK W., Supt. of Rolling Stock, N. Y. C. & H. R. R. Co., New York.

BROOM, BENJ. A., Designing & Supervising Engr., Sioux City, Iowa.

BROWN, ALFRED C., Genl. Supv. of Equipment, Edison Div., Lamp Wks., General Electric Co., Harrison, N. J.

BROWN, LYMAN H., Mech. Engr., The Travelers Ins. Co., Hartford, Conn.

BROWNING, FRANK H., Mech. Engr., Union Sulphur Co., Sulphur Mines, La.

BRUCE, ALFRED W., Charge of Specification Dept., American Locomotive Co., New York.

BRUFF, C. L., Combustion Engr., United Gas Improvement Co., Philadelphia, Pa.

BUCK, CARL F., Mech. Engr., American Smelting & Refining Co., New York.

BURDICK, GEORGE S., Estimating Engr. & Rep., Allis-Chalmers Mfg. Co., Milwaukee, Wis.

BURGES, CHARLES W., Supt., Yost Typewriter Wks., Bridgeport, Conn.

BURLEIGH, ROBERT B., Asst. Foreman, Baldwin Locomotive Wks., Eddystone, Pa.

BURROWS, ROBERT J., Engr., Celfor Tool Co., Buchanan, Mich.

BURTON, W. DEAN, Mech. Engr., McKean Motor Car Co., Omaha, Nebr.

CAMPBELL, DONALD, Patent Lawyer, Partner of Rogers, Kennedy & Campbell, New York.

CAMPBELL, THOS. D., Vice-Pres. & Genl. Mgr., Thos. D. Campbell & Co., Los Angeles, Cal.

CARLSON, WALTER W., Prof., Kansas State Agri. College, Manhattan, Kansas.

CARRUTHERS, J. A., M. M., Canadian Pacific Rwy. Mines, Hosmer, B. C.

CHASE, FRED S., Secy., Waterbury Mfg. Co., Treas., Chase Rolling Mill Co. and Chase Metal Wks., Waterbury, Conn.

CHEVALIER, LaRUE B., Supt., United Iron Works Co., Iola, Kansas.

CLAPP, WILL H., Prof., Throop College of Tech., Pasadena, Cal.

CLARK, EDWARD L. C., Mgr., Miehle Printing Press & Mfg. Co., Taunton, Mass.

CLARK, FRANK D., Rep., Engineering Supervision Co., New York.

CLARK, PETER J., Draftsman, Div. of Fire Marshal, Fire Dept., City of New York.

CLARK, WM. E., Principal, Beach Manual Training School, Oshkosh, Wis.

CLARK, WM. T., Mfg. Mgr., Enterprise Mfg. Co. of Pa., Philadelphia, Pa.

COLLAMORE, RALPH, Cons. Engr., Smith, Hinchman & Grylls, Detroit, Mich.

COOK, OTTO W., Supt., Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

CURTIS, LEWIS E., Cons. Engr., 1574 Crossing St., Chicago, Ill.

DANZIGER, JACOB CARL, Manager, Detroit Motor Castings Co., Detroit, Mich.

DECHERD, CONSTANT K., M. M., International Silver Co., Meriden, Conn.

DEDRICK, BENJ. W., Instr., Flour Mill Engrg., Penn. State College, State College, Pa.

DEMAREST, HENRY S., Sales Mgr., Greene, Tweed & Co., New York.

DEMPSEY, HARRY B., Rep., Quigley Furnace & Foundry Co., New York.

DENNY, OMER, Cons. Engr., 58 Sutter St., San Francisco, Cal.

DILLON, EDWARD P., Railway & Lighting Sales Dept., Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

DODGE, IRVING B., Designer, Lombard Governor Co., Ashland, Mass.

DODGE, JOHN F., Member of Firm, Dodge Brothers, Detroit, Mich.

DUNHAM, BYRON W., Ch. Draftsman, Inter Ocean Plant, Railway Steel Spring Co., Chicago Heights, Ill.

EDMUNDS, LOUIS L., Asst. Supt., American Beet Sugar Co., Chino, Cal.

EISENHART, HARRY W., Rep., Bethlehem Steel Co., Pittsburgh, Pa.

ELLIOTT, AUGUSTUS H., Rep., American Brake Shoe & Fdy. Co., Philadelphia, Pa.

EVANS, GEORGE B., Asst. Genl. Mgr. & Ch. Engr., The Laclede Gas Light Co., St. Louis, Mo.

FARNHAM, THADDIUS L., Ch. Engr., The Platt Iron Wks. Co., Dayton, Ohio.

FEICHT, RUSSELL S., Mgr. of Engrg., Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

FENSTERMAKER, SIDNEY E., JR. Partner, Weinshank & Fenstermaker, Indianapolis, Ind.

FISH, EDWARD R., Secy., Heine Safety Boiler Co., St. Louis, Mo.

FISHER, JAS. P., Chief Engineer, Hope Engrg. & Supply Co., Pittsburgh, Pa.

FITCH, GEORGE K., Ch. Engr., Kaw Boiler Wks. Co., Kansas City, Kansas.

FITCH, WALTER S., Constr. Engr., Dennison Mfg. Co., Framingham, Mass.

FOSDICK, FREDERICK, Pres., Fitchburg Steam Engine Co., Fitchburg, Mass.

FOURNIER, THOS. F., Efficiency Engr., The Lamson Co., Boston, Mass.

FROST, VINCENT M., Engr., Plant Dept., Public Service Elec. Co., Newark, N. J.

GANSTER, JOSEPH A., Asst. Supt., Standard Roller Bearing Co., Philadelphia, Pa.

GODEKE, HARRY F., Instr. in Mech. Engrg., Univ. of Ill., Urbana, Ill.

GRAFF, CHARLES E., Mgr., Eagle Wks., Standard Oil Co., New York.

GRIMES, LESTER A., Inspr., Automatic Sprinkler Dept., New York Fire Ins. Exch., New York.

GUDHEIM, HARRY E., Prof., Virginia Polytechnic Institute, Blacksburg, Va.

GURNEY, DAYTON A., Draftsman, Field Carriage Div., Ordnance Office, U.S.A., Washington, D. C.

HAFER, GEORGE, JR., Genl. Mgr. & Ch. Engr., Garford Engrg. Co., Elyria, Ohio.

HALL, KEPPELE, Cons. Engr., Associate of Sanford E. Thompson, Newton Highlands, Mass.

HALLADAY, CALVIN L., Ch. Engr., The Lewis Spring & Axle Co., Jackson, Mich.

HANSEN, CARL M., Secy. & Ch. Engr., Workmen's Compensation Service Bureau, New York.

HANSHEW, GEORGE O., Charge of Engrg., J. D. Maxwell Motor Corp., Tarrytown, N. Y.

HARDEN, FRANK W., Mech. Engr., North & Standard American Dredging Co., San Francisco, Cal.

HART, FREDERICK A., Underwood Computing Mch. Co., New York.

HATHAWAY, JOSEPH D., Genl. Supt., Northern Electric Co., Montreal, P. Q.

HAYES, TRUMAN D., Rep., International Steam Pump Co., Troy, N. Y.

HEFTLER, VICTOR R., Pres. & Genl. Mgr., The Zenith Carbureter Co., Detroit, Mich.

HENDERSON, HERBERT, Constr. Engr., Gulf Refining Co., Pt. Arthur, Texas.

HENRY, FERDINAND G., Ch. Engr., Burkhart Auto Shoe Polishing Mch. Co., New York.

HERN, JOSEPH L., Cons. Mech. Engr., J. L. Hern Engrg. Co., Boston, Mass.

HICKMAN, CHAS. D., Cons. Engr., 328 Chestnut St., Philadelphia, Pa.

HOBBLE, ARTHUR C., Cons. Engr., Rushville, Ill.

HOLLAND, RAY K., Principal Asst. Engr. with Gardner S. Williams, Cons., Civ. & Hyd. Engr., Ann Arbor, Mich.

HOUGHTON, BERT, Asst. Engr., Operating Dept., Edison Elec. Ill. Co., B'klyn, N. Y.

HOUM, CARL A., Asst. Ch. Engr., Illinois Steel Co., Milwaukee, Wis.

HOWARD, GEORGE K., Ch. Engr., Transit Development Co., Brooklyn, N. Y.

HUELLE, HERMAN R., Designer, Mining Mchy., Trent Engrg. Co., Reno, Nev.

HUME, WALTER E., Engr., Constr. Mgr.'s Office, Otis Elevator Co., New York

HUNTER, JOHN A., PROF., Mech. Engrg., Univ. of Colorado, Boulder, Colo.

ISHAM, ALONZO K., Pres. & Genl. Mgr., West Coast Iron Wks., Seattle, Wash.

JACKSON, WALTER L., Ch. Engr. & Mech. Supt., First Natl. Bank Bldg., Chicago, Ill.

JACOBY, BENJ., Mech. Engr., Marion Steam Shovel Co., Marion, Ohio.

JAY, WALTER F., Wks. Mgr., Power Specialty Co., Dansville, N. Y.

JOHNSON, DEAN M., Mech. Engr., Dodge Mfg. Co., New York.

JONES, ROBERT R., Asst. Ch. Engr., Firestone Fire & Rubber Co., Akron, Ohio.

JONES, WM. S., Mgr., Bar Steel Dept., Midvale Steel Co., Philadelphia, Pa.

KANE, FRANCIS J., Draftsman, Waterbury Farrel Fdy. & Mch. Co., Waterbury, Conn.

KANE, THOS. H., Wks. Mgr., Trussed Concrete Steel Co., Youngstown, Ohio.

KARMAZIN, JOHN, Designer, Experimental Dept., McCormick Wks., International Harvester Co., Chicago, Ill.

KEEFE, THOMAS E., Mech. Rep., National Acme Mfg. Co., Cleveland, Ohio.

KELLY, THOMAS C., Mech., Engr., Triumph Ice Mch. Co., Cincinnati, Ohio.

KENNEDY, ANTHONY, Pres., United States Safe Co., Elizabeth, Pa.

KENNEDY, WALTER, Cons. Engr., 714 Bessemer Bldg., Pittsburgh, Pa.

KERMER, MARTIN J., Mech. Engr., Swenson Evaporator Co., Chicago, Ill.

KIDDER, WALTER M., Efficiency Engr., 1421 Arch St., Philadelphia, Pa.

KINNEY, JOSEPH N., Eastern Sales Mgr., The Ohio Locomotive Crane Co., Bucyrus, Ohio.

KLING, LOUIS A., Supt., The G. C. Kuhlman Car Co., Cleveland, Ohio.

KING, CARL, Instr., Wentworth Institute, Boston, Mass.

KRIMMEL, ERNST, Canadian Mgr., Nygren, Tenney & Ohmes, Montreal, P. Q.

LACROIX, ARTHUR J., Supt. and Member of Firm, The Hyde Mfg. Co., Southbridge, Mass.

LAICHINGER, JOHN, Ch. Engr., Tait & Nordmeyer Engrg. Co., St. Louis, Mo.

LAMONT, CLARENCE B., Asst. to Pres., Seattle Constr. & Dry Dock Co., Seattle, Wash.

LAUER, HERBERT H., Estimator Midvale Steel Co., Philadelphia, Pa.

LEWIS, EDWIN, Engr., N. Y. Telephone Co., Engrg. Dept., New York.

LEWIS, LEROY M., Secy. & Treas., Assoc. Automatic Sprinkler Co., Philadelphia, Pa.

LISKOW, B. H., Supt., Kirtley Creek Gold Dredging Co., Salmon, Idaho.

LONG, GEORGE A., Genl. Mgr., The Gray Telephone Pay Station Co., Hartford, Conn.

LUNDEHN, OTTO, Ch. Draftsman, The Swift Refrigerator Transportation Co., Chicago, Ill.

MCALPINE, BRUCE C., Mech. Engr., Frost Gear & Mch. Co., Jackson, Mich.

MACDONALD, HARRY P., Supt., The Snead & Co. Iron Wks., Jersey City, N. J.

MACKIE, DANIEL M., Genl. Foreman, The Chain Belt Co., Milwaukee, Wis.

MAY, HERBERT S., Mgr., General Bakelite Co., New York.

MITCHELL, COURTNEY N., Asst. Engr., Chandler Motor Car Co., Cleveland, Ohio.

MOORE, CHARLES B., Vice-Pres., Oxweld Railroad Service Co., Chicago, Ill.

MORRISON, MAX P., Ch. Draftsman, American Steel & Wire Co., Trenton, N. J.

MORTON, HARRY E., State Inspr. of Boilers for Commonwealth of Mass., Boston, Mass.

MOSES, BEN D., Instr. in Mech. Engrg., Univ. of Cal., Berkeley, Cal.

NEFF, ASA J., Cons. Mech. Engr., 3711 Cole Ave., Dallas, Texas.

NEWBURN, THEO. W., Asst. Res. Engr., Westinghouse Air Brake Co., Pittsburgh, Pa.

NEWELL, WALLACE L., Designing Engr., Westerman Iron Wks., Seattle, Wash.

NICHOLS, ALBERT W., Engr., Westinghouse, Church, Kerr & Co., New York.

NICOL, JOHN, Engr., Union Elec. Lt. & Pwr. Co., St. Louis, Mo.

O'BRIEN, THOMAS, Engr. & Sales Mgr., John F. Allen Co., New York.

OBRIG, ADOLPH, Charge of Estimating Dept., Otis Elevator Co., New York.

OGLEBAY, CRISPIN, PRES., The Ferro Mch. & Fdy. Co., Cleveland, Ohio.

O'LEARY, DANIEL, M. M., Columbia & Puget Sound R. R., Seattle, Wash.

OPPERMANN, FRED M., Mgr., Nordish Plate Glass Wks., St. Petersburg, Russia.

OVERN, JOHN, JR., Mech. Engr., I. P. Morris Co., Philadelphia, Pa.

PARKER, THOMAS T., Engr. & Ch. Boiler Inspr., Fidelity & Casualty Co., New York.

PAULSON, PETER A., Supt., Sulphite Mill., Kimberly-Clark Co., Neenah, Wis.

PEIRCE, EDWIN J., JR., Production Mgr., R. Hoe & Co., New York.

PELLY, JOHN F., Mech. Engr., Bethlehem Steel Co., So. Bethlehem, Pa.

PETERSEN, SVERRE, Mech. Engr., Henry R. Worthington Co., Harrison, N. J.

PHILLIPS, CECIL O., Mgr., Mech. Dept., American Cotton Oil Co., New York.

PORTER, JAMES B., Elec. Engr. & Rep., General Electric Co., Philadelphia, Pa.

POTTER, NATHAN S., JR., Vice-Pres. & Genl. Mgr., Michigan Portland Cement Co., Chelsea, Mich.

QUAYLE, ROBERT, Genl. Supt., M. P. & Car Dept., Chicago & Northwestern Rwy. Co., Chicago, Ill.

RABER, BENEDICT F., Assoc. Prof. in Mech. Engrg., Univ. of Nebraska, Lincoln, Nebr.

RANDOLPH, FRANK D., Ch. Draftsman, Potter Printing Press. Co., Plainfield, N. J.

REUSCHLINE, GEORGE L., Supt. of Mfg., American Ice Co., Philadelphia, Pa.

RIESNER, MICHAEL, Ch. Engr., Laidlaw-Dunn-Gordon Co., Cincinnati, Ohio.

ROBERTS, LEROY C., Instr., Extension Div., University of Wisconsin, Milwaukee, Wis.

ROGERS, RALPH W., Asst. Engr., Filter Plant Constr., Water Wks. Dept., City of Cleveland, Ohio.

ROOT, JOSEPH J., JR., Ch. Draftsman & Asst. Mech. Engr., Union Tank Line Co., New York.

SAMSON, CHARLES L., Mech. Engr., The Griffin Wheel Co., Chicago, Ill.

SCHELHAMMER, HERMAN, Asst. Factory Mgr., Bosch-Magneto Co., Springfield, Mass.

SCHLESINGER, ALFRED H., 926 Tenth St., College Point, N. Y.

SCHMIDT, ALBERT G. A., Pres. & Engr., National Equipment Co., Chicago, Ill.

SEIDEL, VICTOR B., Rep., Ingersoll-Rand Co., New York.

SEIGLE, WM. R., Genl. Factory Mgr., H. W. Johns-Manville Co., New York.

SEYMOUR, RALPH C., Mgr. & Mech. Engr., Goss Printing Press Co., New York.

SHELDON, EDWARD P., Ch. Draftsman, R. Hoe & Co., New York.

SHEPARD, JAMES A., Secy. & Ch. Engr., Shepard Elec. Crane & Hoist Co., Montour Falls, N. Y.

SHOOP, CHARLES F., Asst. Prof., Experimental Engrg., Univ. of Minn., Minneapolis, Minn.

SIEBERT, FRANK T., Dist. Inspr. of Locomotive Boilers, Interstate Commerce Com., Nashville, Tenn.

SIMMONS, HERMAN R., Mech. Engr., Lorraine Mfg. Co., Pawtucket, R. I.

SIMPSON, GEORGE T., Cons. Engr., 635 Polk Blvd., Des Moines, Iowa.

SMITH, ROBERT W., Constr. Engr., Michigan Alkali Wks. No. 2, Wyandotte, Mich.

SMITH, STANFORD C., Mgr., McClave-Brooks Co., New York.

SNELL, LYLE K., Executive Engr., Cadillac Motor Car Co., Detroit, Mich.

SNOW, ELMER J., Asst. to Vice-Pres., American Brakeshoe & Fdy. Co., Mahwah, N. J.

STADLER, CHARLES, Supt., Construction and Equipment of Branch Markets, Sulzberger & Sons Co., Chicago, Ill.

STARRETT, GOLDWIN, Arch., Starrett & Van Vleck, New York.

STEARNS, HAROLD E., Supt. & Treas., Dominion Wadding Co., Ltd., and Montreal Quilting Co., Ltd., Montreal, Canada.

STEPHENS, THOS. S., Branch Mgr., Manning, Maxwell & Moore, Inc., St. Louis, Mo.

STRATTON, JOHN F. O., Supt. of Constr., Middle West Utilities Co. of Ill., Chicago, Ill.

TALBOT, HOWARD H., Engrg. Dept., The Wm. Tod Co., Youngstown, Ohio.

TERRY, KILLEY E., JR., Supt. of Pwr., S. D. Warren & Co., Cumberland Mills, Me.

TILLEY, JOHN, Mech. & Elec. Engr., Marc Eidlitz & Son, New York.

TOPPING, HOWELL, Engr. & Rep., Ohio Locomotive Crane Co., New York.

TOWER, J. WALLACE, Engr. with H. S. Ferguson, Cons. Engr., New York.

TRAUDT, WM. F., Mech. Engr. and Eastern Sales Mgr., Taber Pump Co., Buffalo, N. Y.

TRIPP, SAMUEL F., Supt. of Constr., Interborough Rapid Transit Co., New York.

TUTTLE, HENRY G., Head of Contract Dept., Lockwood, Greene & Co., Boston, Mass.

VAN ALLEN, CHAS. P., Ch. Engr. & Supt. of Bldgs., Gimbel Brothers, New York.

VANCE, WALTER N., Vice-Pres., Durand Steel Locker Co., Chicago Heights, Ill.

VAN DERVOORT, WM. H., Pres. & Mgr., The Root & Van Dervoort Engrg. Co., and Moline Automobile Co., E. Moline, Ill.

WALTHER, WM. E. A., Constr. Supt., Viele, Blackwell & Buck, New York.

WATSON, RALPH B., Engr. of Tests, Erie Railroad, Meadville, Pa.

WEIR, SILAS E., Wks. Mgr., American Blower Co., Detroit, Mich.

WELLS, WALTER F., Vice-Pres. & Genl. Mgr., Edison Elec. Ill. Co., Brooklyn, N. Y.

WHAREN, GEORGE B., Instr., Wentworth Inst., Boston, Mass.

WHARTON, JAMES R., Mech. Engrg. Dept., University of Mo., Columbia, Mo.

WHITACRE, RICHARD V., JR., Supt., The Neverslip Mfg. Co., New Brunswick, N. J.

WHITLEY, FREDERIC N., Engr. & Contr., 215 Fulton St., Brooklyn, N. Y.

WILHELM, DEAN B., Engr., Pressed Metal Radiator Co., Pittsburgh, Pa.

WILSON, RALPH E., Supt., Continental Gin Co., Dallas, Texas.

WITHROW, PAUL C., Mech. Engr., D. & R. G. R. R., Denver, Colo.

WOLFF, SALOMON, Dist. Mgr., De Laval Steam Turbine Co., Chicago, Ill.

WOOD, HARRY P., Operating Engr., Edison Elec. Ill., Co., Brooklyn, N. Y.

WOOD, WINTHROP B., Asst. Ch. Engr., Joseph Bancroft & Sons Co., Wilmington, Del.

WORRELL, HOWARD G., Inspr., Struthers-Wells Co., Warren, Pa.

WURDOCK, HUGO, Pres., The Light & Development Co., St. Louis, Mo.

ZWOYER, ELLSWORTH B. A., Designing and Erecting Briquette Machinery and Briquetting Plant, Zwoyer Fuel Co., New York.

FOR CONSIDERATION AS ASSOCIATE-MEMBER OR JUNIOR

ASRIEL, CAMILLO J., Draftsman, Ingersoll-Rand Co., Phillipsburg, N. J.

BERGER, JULIUS G., Pwr. Specialist on Factory Drive, General Elec. Co., New York.

BLACKBURN, BYRAN M., Asst. Engr., R. D. Cole Mfg. Co., Newnan, Ga.

BRADFORD, LOUIS J., Instr. in Mch. Design, Sibley College, Ithaca, N. Y.

BRANDES, WM. P., Cost Accountant & Engr. with H. S. Kerbaugh, Inc., Magnolia, W. Va.

BRENGEL, FREDERICK J. J., Head, Production Dept., Safety Car Htg. & Ltg. Co., Jersey City, N. J.

COLEMAN, ROBERT J., Rep., Ames Iron Wks., Philadelphia, Pa.

CORY, FRED C., Power Specialist, The Toledo Railways & Light Co., Toledo, Ohio.

DOLE, IRA B., Retort Foreman, Federal Creosoting Co., Paterson, N. J.

DORROW, HERBERT V., Constr. Engr., N. Y. & N. J. Constr. Co., Jersey City, N. J.

DOYLE, JOSEPH A., Designing and Installation of Industrial Heating Equipment, W. S. Rockwell Co., New York.

FUSSELMAN, PAUL A., Genl. Shop Foreman, Kansas City Gas Co., Kansas City, Mo.

GAYLORD, WM. W., Ch. Draftsman, American Brass Co., Torrington, Conn.

GILLIAM, THOMAS B., Asst. Engr. of Tests, Island Coal Sales Co., Cincinnati, Ohio.

HAGEMANN, GEORGE E., Instr. in Mech. Engrg., Univ. of Penn., Philadelphia, Pa.

HAMMOND, HARRY S., Rep., Pressed Steel Car Co., Pittsburgh, Pa.

HANKISON, LEWIS E., Supt., Power Sta., West Penn. Railways Co., Connellsville, Pa.

HARDING, HOWARD, Asst. Engr., Rochester Railway & Light Co., Rochester, N. Y.

HEARD, H. V., Mgr., American Blower Co., Seattle, Wash.

HECKER, ARNOLD J., Mech. Engr. & Designer, Tait & Nordmeyer Eng. Co., St. Louis, Mo.

HOEXTER, SAMUEL J., Instr., Dept. of Engrg., Univ. of Michigan, Ann Arbor, Mich.

HUNT, JAMES L., Mech. Engr., Alberger Pump & Condenser Co., New York.

JOHNSON, GEORGE T., Mech. Engr., Buckeye Steel Castings Co., Columbus, Ohio.

JONES, SPRAGUE, Designer, The Power Equipment Co., Toledo, Ohio.

KIRKUP, HAROLD B., Asst., Steam Engrg. Dept., Cambria Steel Co., Johnstown, Pa.

KREMERS, CLARENCE H., Constr. Engr., Mammoth Copper Mining Co., Kennett, Cal.

LIPE, CLIFFORD E., Ch. Engr., Brown Lipe Gear Co., Syracuse, N. Y.

MARKS, JAMES H., Supt., Bldgs. & Grounds Dept., Univ. of Michigan, Ann Arbor, Mich.

MOODY, HARRY L., Rep., Westinghouse Machine Co., Boston, Mass.

MOYER, AMOS F., Designer & Mech. Engr., Auto Engine Works, St. Paul, Minn.

NEWCOMER, MARTIN, Treas. & Head of Experimental Work, Volotone Co., Elizabeth, N. J.

OAKES, GEORGE W., Asst. Engr., Pittsburgh Plate Glass Co., Pittsburgh, Pa.

OGDEN, NELSON, Draftsman, New London Ship & Eng. Co., Groton, Conn.

OWESEN, HENRIK, Asst. Ch. Draftsman, Standard Steel Car Co., Butler, Pa.

PERATT, WM. H., Mech. Draftsman, St. Lawrence River Pwr. Co., Massena, N. Y.

POPE, CLARENCE J., Engrg. Dept., The Arlington Co., Arlington, N. J.

PROCHASKA, CHARLES, Engr., E. W. Hunt Co., W. New Brighton, N. Y.

RASCOVICH, MARCUS B., Mech. Engr., Alaska Treadwell Gold Mining Co., Treadwell, Alaska.

ROBB, CHARLES A., Lecturer, Mech. Engrg., Univ. of Alberta, Edmonton, South Alberta, Canada.

ROBERTS, CHAPIN, Safety Engr., Sears, Roebuck & Co., Chicago, Ill.

SARGENT, LEON H., Rep., Standard Plunger Elev. Co. of N. Y., Buffalo, N. Y.

SCHMIEDEKNECHT, VICTOR E., Designer, Aurora Automatic Mchy. Co., Chicago, Ill.

SNYDER, THOMAS A., Asst. Estimating Engr., Bucyrus Co., So. Milwaukee, Wis.

STALEY, ALLEN C., Instr., Mech. Engr., Sheffield Scientific School, New Haven, Conn.

STEWART, STANLEY P., Mech. Engr., Stewart Boiler Works, Worcester, Mass.

TACCHELLA, ADOLF A., Designer, Busch-Sulzer Bros.-Diesel Eng. Co., St. Louis, Mo.

TAYLOR, ALFRED J. T., Genl. Mgr. & Vice-Pres., Taylor & Young, Ltd., Vancouver, B. C.

TAYLOR, WALTER C., Res. Engr., H. C. Raynes, Inc., Boston, Mass.

TRENOR, ALBERT D., Engr., Hammond Radio Research Laboratory, Gloucester, Mass.

VAN ETTEN, PERCY H., Acting Res. Engr., South San Joaquin Irrigation Dist., Manteca, Cal.

WAKEMAN, JEAN R., Asst. Supt., Bridgeport Brass Co., Bridgeport, Conn.

WHEELER, FRED B., Instr., North Carolina Agri. & Mech. College, West Raleigh, N. C.

WOOD, S. G., Mech. Drawing & Manual Training Instr., High School, Bayfield, Wis.

ZELLER, RICHARD, Factory Mgr., Egyptian Lacquer Mfg. Co., Rahway, N. J.

FOR CONSIDERATION AS JUNIOR

BEATTY, C. FRANCIS, Asst. Foreman, Paraffine Oil Dept., Standard Oil Co. of N. Y., Long Island City, N. Y.

BURKE, JOSEPH P., 609 Rose St., La Porte, Ind.

GILSON, JOSEPH L., Draftsman, De La Vergne Mch. Co., New York.

GRAESSER, CARL F., Draftsman, New York Steam Co., New York.

HAYNES, JAMES L., Instr., Purdue University, Lafayette, Ind.

HENRY, VERNOR S., Asst. Engr., Safety Car Htg. & Ltg. Co., Jersey City, N. J.

JEANNERET, LEON E., With Babcock & Wilcox Co., Bayonne, N. J.

KEASBEY, AERTSEN P., Asst. to Pres., Robert A. Keasbey Co., New York.

LESHER, PAUL T., Checker, Engrg. Dept., New Jersey Zinc Co., Palmerton, Pa.

MATTSON, EARL N., Draftsman & Designer with E. B. Van Keuren, Birmingham, Ala.

NEILAN, ROBERT H., Asst. in Mech. Engrg., Ohio State Univ., Columbus, Ohio.

RUTTER, JOHN A., Tasksetter, Gantt Bonus System, Standard Roller Bearing Co., Philadelphia, Pa.

SAVAGE, SIDNEY F., Engrg. Draftsman, The United Ill. Co., New Haven, Conn.

SMITH, MILES M., Asst. Mech. Engr., Hartwell Iron Works, Houston, Texas.

TAYLOR, WM. H., Instr., Penn. State College, State College, Pa.

VOELKER, FRANK, Asst. to Engr. of Tests, New York Edison Co., New York.

WIEDEMANN, FRANK R., Draftsman, Weber Electric Co., Schenectady, N. Y.

WOODMAN, JOSEPH C., Supt. of Constr., Decarie Incinerator Co., Minneapolis, Minn.

TRANSFER FROM ASSOCIATE

CLARK, WALTER R., Head, Engrg. Dept., Bridgeport Brass Co., Bridgeport, Conn.

PROMOTION FROM JUNIOR

AUSTIN, ADOLPH O., Refrigerating Engr., Karl Wegeman Co., New York.

AUTENRIETH, GEORGE C., Instr., College of City of New York, and Engr., G. C. Vaporizer Co., New York.

BAXTER, BURKE M., Associate, H. B. Prather, Cons. Engr., Cleveland, Ohio.

BOWERMAN, MYRON R., Instr., Kansas State Agri. College, Manhattan, Kansas.

CAMPBELL, GORDON, Pres. & Genl. Mgr., York Railways Co., York, Pa.

CUNNINGHAM, GEORGE H., Designer, Anaconda Copper Mining Co., Anaconda, Mont.

DANFORTH, N. LORING, Pres., John W. Danforth Co., Genl. Contrs., Buffalo, N. Y.

GOENTNER, WM. B., Asst. Engr., Dept. of Water Supply, Gas & Elec., New York.

HARGRAVE, RUSSELL W., Cons. Engr., also Principal of Industrial Continuation Schools, City of Menasha, Wis.

HOWARD, CECIL D., Designing Engr., Gas Engine Dept., National Transit Co. Shops, Oil City, Pa.

HVID, MARINUS, Ch. Draftsman, Inland Steel Co., Indiana Harbor, Ind.

JOHNSON, WM. M., Engr., Charge of Water Supply & Fire Protection, Panama Pacific Internatl. Exposition, San Francisco, Cal.

KALES, WM. R., Ch. Engr., Whitehead & Kales Iron Wks., Detroit, Mich.

KENNEDY, WM. A., Testing Engr., Genl. Fire Extinguisher Co., Providence, R. I.

KLEIN, WM. H., Supt., Dixie Portland Cement Co., Richard City, Tenn.

LEE, RALPH A., Mech. Engr., Ch. Draftsman, Barrett Mfg. Co., New York.

LESSER, WM. H., Mech. Engr., Philadelphia & Reading Coal & Iron Co., Pottsville, Pa.

MIDGLEY, FREDERICK W., Ch. Draftsman, Otis Elevator Co., New York.

MOREHEAD, WM. C., First Vice-Pres., National Light & Power Co., St. Louis, Mo.

PALMER, VIRGIL M., Purchasing Engr., Eastman Kodak Co., Rochester, N. Y.

PEEL, FRED. P., Mech. Engr. and Tech. Instr., Washington Civil Service School, Washington, D. C.

SELSER, THOMAS W., Mech. Engr., Union Tool Co., Torrance, Cal.

SEWARD, HERBERT L., Instr., Sheffield Scientific School, New Haven, Conn.

STROUD, EDWIN G., Pres. & Mgr., The Cleveland Engrg. Agency Co., and Pres., E. G. Stroud Co., Cleveland, Ohio.

THOMA, CHARLES, Supt., Die Dept., E. W. Bliss Co., Brooklyn, N. Y.

THOMA, WALTER, Ch. Mech. Inspr., E. W. Bliss Co., Brooklyn, N. Y.

WILCOX, PERLEY S., Asst. Mgr., Kodak Park Wks., Eastman Kodak Co., Rochester, N. Y.

WILLIAMS, FAY B., Mech. Engr., Lamson Co., Boston, Mass.

SUMMARY

New applications	300
Transfer from Associate	1
Promotion from Junior	28
Total	329

THE ST. PAUL—MINNEAPOLIS MEETING

FEATURES OF THE TWIN CITIES WHERE THE SPRING MEETING IS TO BE HELD

THE Twin Cities, located at the geographical center of North America, have become the great commercial center of the American Northwest; with distinct business sections but ten miles apart, they merge in a large manufacturing district. Four interurban street car lines connect them, furnishing fast and convenient service with large and easy riding cars.

MINNESOTA STATE CAPITOL

The location of these cities has made them a center for nine railroad systems, the passenger and freight traffic of which are enormous. A government dam, already in process of construction between St. Paul and Minneapolis, will open the Mississippi River as another important avenue of transportation. Boats, which now come up the river only as far as St. Paul, will, at the completion of this dam, be able to reach Minneapolis.

St. Paul, though it is a manufacturing and jobbing city of reputation and a great railroad terminal, is most important as the capital city of the North Star State. It is built on a series of hills that rise gradually from the banks of the Mississippi, and every advantage has been taken of the natural beauties to make the city picturesque. The main business portion lies on a great plateau just above the river's edge; beyond in every direction rise hills on which rest the residence sections of the city.

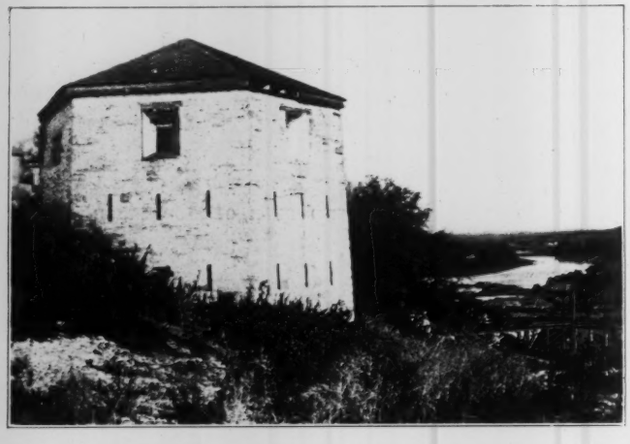
Scores of beautiful parks dot the city over, the chief being Como Park, with an area of 425 acres, in the midst of which are two fine little lakes, and Phalen

VIEW OF MISSISSIPPI RIVER AND PUBLIC BATHS, ST. PAUL

Park, containing 469 acres. On an island in the river opposite the main business section of the city are the free public baths, with public playgrounds and a zoo. On other islands in the river are headquarters of the rowing, motor boat and canoe clubs. Just above the islands is the famous High Bridge, a structure spanning the river, with a roadway 2717 feet long and 224 feet above the river.

Summit Avenue has for years held its place as one of the most beautiful residence avenues in the country. For a long distance the avenue skirts the bluff, affording a splendid view of the river below, the opposite bluffs, and the business portion of the city. Several miles out, Summit Avenue joins the River Drive, which runs along the bluff from Fort Snelling to Minneapolis. But a few miles beyond the fort are the Falls of Minnehaha, made famous by Longfellow.

Panoramic View of St. Paul Taken



Old Stone Tower at Fort Snelling, Minneapolis

St. Paul's public buildings are many and interesting, some of the finest being the Minnesota State Capitol, the new Roman Catholic Cathedral, the municipal auditorium, and the James J. Hill Reference Library, now in course of construction.

Minneapolis, granting to St. Paul the political precedence, claims for itself the title of commercial capital of the State of Minnesota. It is essentially a manufacturing city, and ranks fourteenth of all the cities of the country in volume of manufactures, while at the same time it is recognized as one of the most beautiful

Panoramic View of Minneapolis Looking East from Hotel Leamington

FROM WEST BANK OF MISSISSIPPI RIVER

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cities in the world. The city as a manufacturing center owes its existence to the Falls of St. Anthony in the Mississippi. The early reduction of the forests and the beginnings of wheat growing in the Northwest made the saw mills and flour mills the first industries, but others came, and today there are 1200 manufactories. Minneapolis is the world's chief producer of flour, with immense mills and two of the largest grain elevators in the world.

Minneapolis is the seat of the state university, the campus of which covers 85 acres on the east bank of the river, and the enrollment of students this year in the eight colleges and three schools is nearly 7000. The city is an art center and a magnificent museum is being erected in the residential district. There are many private collections of paintings, among them that belonging to Mr. T. B. Walker, which is one of the best in the country. The Civic and Commerce Association of the city has a membership of 3000, and in two years has attained prominence as one of the most effective organizations of its kind in the United States.

Twenty lakes are to be found within the city limits of Minneapolis, and nearly as many more in St. Paul; fully one hundred others are within a radius of 25 miles of each city. White Bear Lake is reached by fast electric cars from St. Paul. This is a beautiful body of water with irregular shore lines dotted with fine summer homes. A few minutes' ride beyond

MR. GEBHARD BOHN'S RESIDENCE, LAKE MINNETONKA

MILLING DISTRICT ON EXTREME RIGHT IN THE BACKGROUND

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